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ABSTRACT

This document reports on a color-coding innovation designed to improve the spelling ability of high school seniors. This color-coded system is based on two assumptions: that color will appeal to the students and that there are three principal reasons for misspelling. Two groups were chosen for the experiments. A basic list of spelling demons was drawn up to examine whether particular rules were responsible for words on the list. A total of 116 words was color-coded. Three colors - red, green, and yellow - were used as meaningful for car-conscious high school students. Transparancies were made with five words on each transparency. Three days a week, a new transparency of five words was projected and an explanation of the five given. Two days a week previous transparencies were used to keep a steady review in progress. Unannounced periodic tests were administered. Statistics clearly show that the color-coded method was superior to the traditional spelling-list announced-test techniques. It is concluded that the use of visual presentations, especially those connected with technology, is meaningful to present-day high school students. It is recommended that teachers of language become more sensitive to the visual stress in popular culture. (CK)

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REDS, GREENS, YELLOWS EASE THE SPELLING BLUES

by Virginia Irwin

"when will they ever learn?"
". . . when will they learn

This line from a currently popular song graphically expresses the feeling I developed over a period of years as a promotor of correct spelling in conjunction with English teaching. After instructing several classes of both college-preparatory and remedial seniors, I became subject to cries of desperation over the spelling weakness of students. In spite of the knowledge explosion, increased spending on education, and intensified emphasis on advanced training, students showed no improvement in spelling. They continued to misspell elementary words like *to, its,* and *their* in papers dealing with mature topics of considerable depth. A painstaking search through twenty years of educational periodicals, letters to the state colleges and universities in Missouri, conferences with people like the curriculum director of the Missouri State Department of Education, bulletins from industries such as General Electric, and recent writings of English authorties like Dr. James Squire intensified my feeling that spelling was indeed a hair shirt. Moreover I arrived at the conclusion that a methodology change was the only answer, especially after judging two issues carefully.

First, students could understand advanced subjects like physics and math analysis but yet be unsure of spelling elementary words — words they had used since the early years of school.

Second, it was understandable that sitting down with the traditional spelling book or list to study words like *to, its,* and *their* in the same session with Einstein's theory or quadratic equations was no challenge. What kind of approach would, then, be feasible? I reached the decision that my five-minutes-a-day color-coded system of spelling ordinary words with the overhead projector was a possible solution. A thorough study of technology in the classroom coupled with in-depth reading of such current theorists as Marshall McLuhan and his non-linear approach led me to believe that the system warranted experimentation. Two groups of high school seniors were chosen for the experiment. Documentation of the validity of the visual emphasis

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and extensive statistics will not be presented in this article; however such material is available in the complete description of the research and experimentation. In this article I will explain the color-coded system and generally interpret the encouraging statistics resultant from the findings.

The color-coded system is based on two assumptions: that color will appeal to the students and that there are three principal reasons for misspelling. When I decided to develop some kind of constructive method for high school spelling instruction, a basic list of spelling "demons" was examined carefully to determine whether particular rules were responsible for words on the list. One found in several reputable sources, offered no consistency as far as rules were concerned. All rules were involved; several of the frequently misspelled words actually involved no rule. How does one explain, for instance, the spelling rule involved with *capitol* and *capital?* I discarded the rules and started all over, taking the words one at a time and analyzing as to the reason for misspelling. The list eventually fell into three categories — ones that have particular hard spots, ones that are troublesome as a whole (the smallest category), and confusing pairs.

The three traffic colors — red, yellow, and green — seemed meaningful choices for car-conscious high school students. A hundred commonly misspelled words were used for the initial experiment so that it would not be too lengthy. This group was checked against lists in prominent text books, Civil Service Examinations, National Spelling Examination, and college placement examinations.

All of the words were then color coded. *Calendar,* for example, is ordinarily misspelled at the *ar; ar,* then, is in red. Consequently the student must *stop* and concentrate on the red spot. Mischievous is misspelled for two reasons, the pronunciation and the ie problem. If a word is liable to be misspelled all the way through or for two reasons, it is in yellow, meaning *slow down* or *caution* all the way from the first letter to the last. With confusing pairs one is almost always easier to master than the other. In *capitol* and *capital* the *ol* has only one use while *al* has at least four. The *capitol* is in green. By mastering the *ol,* the student knows to *go* with that word; all other times he will use the other *capital.* Finally, a list of sixteen words were added after the Stanford Spelling Research Project was completed, bringing the total to 116. These sixteen are from the list of thirty-eight that the computer could not analyze. Some of the

remaining twenty-two words were already on the list and others did not appear to be ones that the high school students were missing (choir, everyone, handsome, iron, etc.). These sixteen were made in yellow since the entire word could not be analyzed.

Transparencies were made with five words on each transparency except the last with six. Negative acetate was used because it allowed the words to stand out more prominently and the color to be more striking. Three days a week a new transparency of five words was projected, and careful explanation of the five was given. The student then concentrated for five minutes. He could merely concentrate, or practice writing the words, or spell them to himself and check the transparency for accuracy. It was not necessary to keep a list if the five minutes were used wisely; some, however, did keep a list in their notebooks, as much for a security blanket measure, I think, as for anything else. Two days a week previous transparencies were used to keep a steady review in progress. Sometimes after a few minutes I would turn the overhead off and ask the students to write the five they had just been studying. Sometimes I asked them to write only the hardest of the five. Sometimes I asked whether they could remember any word from the day before. Frequently I asked them why a certain word was coded with a particular color. It is simple to turn the machine back on to check accuracy and perhaps try the same exercise again. These lessons were limited to five minutes as often as possible; quite often, however, students wanted additional time or asked to see a previous transparency. This concentration takes practice, but the effort could pay dividends not only in spelling but also in other areas by increasing concentration ability. Unannounced periodic tests were administered to measure progress. Words most commonly missed could easily be reviewed by using the transparency again. The five minutes fit easily into the schedule and serve as variety during the hour. Ordinarily I did the spelling at the beginning of the hour to insure its inclusion.

In order to arrive at a valid statistical conclusion, I accumulated considerable data. The statistics were classified and interpreted under the direction of Mr. Glenn White, Director, Research Coordinating Unit, Missouri State Department of Education, The statistics clearly show that the color-coded method was superior to the traditional spelling-list announced-test technique. I hoped that the visual approach would have more lasting results than the cram-test-forget method of much traditional study. The final phase of testing indicates

that the color helped the students to retain the words after a lapse of two months. Final interpretation was made on the consideration that all of the statistics warrant the assumption that color-coding was responsible for significant progress in senior high school spelling instruction.

Five years ago when I began the tedious trek through twenty years of periodicals to glean some sort of usable technique for spelling instruction, the idea of creating a method was certainly non-existent. The slow and sometimes painful development of the theory has been a valuable experience in increasing my knowledge of the high school English program, its problems, and its promises. The method was created as a hopeful aid to high school students who have been hindered by spelling weakness, a weakness not usually compatible with their other abilities in numerous sophisticated subjects. The cooperation and appreciation of the students have both been ample compensation for time, effort, and expense. The fact that high school students liked the method at all is a victory over much spelling instruction now used in the high school. The fact that their interest did not lag is encouraging. Moreover, in view of the statistics, significant progress seems evident.

I conclude that the use of visual presentations, especially those connected with technology, is meaningful to present-day high school students. Many people apparently forget the spelling of English words easily and readily; conventional exercises and texts are unsatisfactory for promoting mastery at the high school level. I recommend, therefore, that more English teachers become cognizant of the changes that technology has brought to society in general and not ignore the relevancy of electronics in the classroom. I sincerely hope that more teachers will accept the idea that the linear approach is not the only one to learning.

As a final conclusion, I urge teachers of language to become more sensitive to the visual stress in popular culture so that students may be relieved from the clock-watching boredom of much current high school spelling instruction.

CLASSIFICATION AND INTERPRETATION OF DATA

In order to arrive at a valid statistical conclusion, considerable data were accumulated. In September of 1968 both classes were given a diagnostic test of the 116 words to be used in the experiment. The groups were then designated as Group I (experimental) and Group II (control). The plan of procedure was to give Group I the color-coded instruction over a two-month period and Group II traditional instruction, a list of twenty-five a week. In November a second test was administered to both groups. Thereafter, Group II had the list by color-coding, and Group I had the traditional method. In January, 1969, a third test was given and final interpretation was made.

First of all, the groups were analyzed as to the comparability in Ohio Psychological Test scores and in initial spelling ability. The difference in both areas is small enough to be statistically not significant:

SUMMARY OF OHIO PSYCHOLOGICAL TEST SCORES

(In the data below E = sum)

GROUP I	GROUP II
N = 27	28
EX = 1481	1566
—	55.92
X = 54.85	
EX^2 = 91069	98836
S^2 = 364.69	402.81
S = 19.10	20.07
(EX)2/N = 81235.59	87584.14

t value = .203 (not significant)

SUMMARY OF TEST SCORES ON PRETEST (1)

GROUP I	GROUP II
N = 27	28
EX = 1843	1957
$\bar{X}$ = 68.25	69.89
EX^2 = 133693	146935
S^2 = 293.53	363.06
S = 17.13	19.06
$(EX)^2/N$ = 125801.81	136580.32

t value = .331 (not significant)

After Group I had experienced the color coding and Group II the traditional list studying, test 2 revealed significant difference between the groups:

SUMMARY OF TEST SCORES ON TEST 2

GROUP I	GROUP II
N = 27	28
EX = 2846	2254
$\bar{X}$ = 105.40	80.50
EX^2 = 304208	193874
S^2 = 157.80	443.82
S = 12.56	21.07
$(EX)^2/N$ = 299989.48	181447.00

t value = 5.209 (significant)

Expressed another way, the gain is evident:

SUMMARY OF GAIN SCORES BETWEEN PRETEST (1) AND TEST 2

GROUP I	GROUP II
37.22 (MEAN)	10.60 (MEAN)

In the SUMMARY OF TEST SCORES ON TEST 2 consideration must be given to whether the difference can be attributed to chance. If the t ratio were below 1.684, the difference could be due to chance. A difference above 1.684, however, is too much to be attributed to chance. The difference — 5.209 — can be traceable to the treatment, namely the color coding.

Group II then experienced the color coding, and Group I reverted to the traditional list technique. However, it was the hope of the researcher that this visual approach to spelling would have more lasting results than the cram-test-forget method of much traditional study. The students were encouraged to use the concept themselves although the transparencies were not available to them. The final testing seems to indicate that the color helped them retain or to continue to study the words. It will be noted that this group did not drop in achievement even with the absence of daily instruction for two months. Since the two groups had indicated comparability on

SUMMARY OF TEST SCORES ON TEST 3

GROUP I	GROUP II
$N = 27$	28
$EX = 2856$	2900
$\overline{X} = 105.77$	103.57
$EX^2 = 305072$	306610
$S^2 = 111.67$	223.61
$S = 10.57$	14.95
$(EX)^2/N = 302101.33$	300357.14

the Ohio Psychological Test scores and on the pretest, and since both groups had experienced equal instruction time with both the color-coding and list techniques, it would be assumed that the final scores would show no significant difference. The summary shows their differences to be low enough to be considered not significant.

t value = .623 (not significant)

An overall look at gain scores gives a graphic synopsis of the two groups:

SUMMARY OF GAIN SCORES — GROUP I

N = 27	Test 1-2	Test 2-3	Test 1-3
EX	1005	10	1013
$\bar{X}$	37.22	.37	37.59
EX^2	41,545	1200	42,837
S^2	153.38	44.31	179.55
S	12.38	6.70	13.40

SUMMARY OF GAIN SCORES — GROUP II

N = 28	Test 1-2	Test 2-3	Test 1-3
EX	297	646	943
$\bar{X}$	10.60	23.07	33.67
EX^2	6131	21,226	39.239
S^2	106.60	225.85	267.73
S	10.32	15.03	16.36

A further summary of individual students is available.

Final interpretation was made on the consideration that all of the statistics warrant the assumption that color-coding was responsible for significant progress in senior high school spelling instruction.